

EMERGENCE, MATURATION AND PARASITES OF TWO ASH
BARK BEETLES, *LEPERISINUS OREGONUS* BLACKMAN
AND *L. CALIFORNICUS* SWAINE
(COLEOPTERA: SCOLYTIDAE)

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This study was part of a larger study of the sonically and olfactorily induced behavior of *Leperisinus oregonus* Blackman and *L. californicus* Swaine (Vernoff and Rudinsky, 1980; Rudinsky and Vernoff, 1979). Wood (1977) has proposed that this genus be placed in synonymy under *Hylesinus* Fabricius.

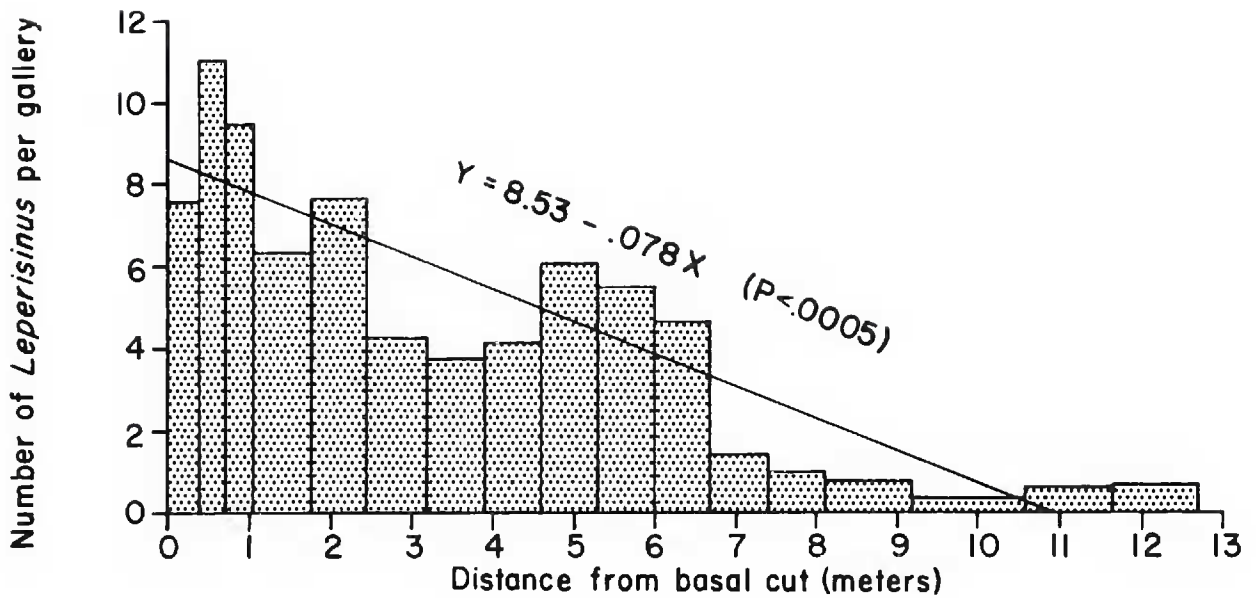
Methods

Observations were made by allowing *L. oregonus* and *L. californicus* to colonize a 24 cm DBH log of *Fraxinus latifolia* Benth., felled 22 April 1975, in an ash woodlot near Corvallis, Oregon. Colonization was mainly by *L. oregonus* in May-June. On 11 August 1975, this tree was bucked (cut) into 36 sections, each 34-37 cm long, numbered with respect to distance from the base, transferred to a shaded part of the Forest Insect Laboratory nursery, and placed inside 38 cm³ galvanized metal emergence boxes. There were 1-4 logs per box. *Leperisinus* adults emerged into the glass light jar on each box and were collected between 14 August and 19 October 1975. Collections were made daily between 31 August and 1 October, and hourly from some boxes on 9-11 September 1975. In September 1976, the length, basal DIB and apical DIB were measured for each log, before it was debarked and the number of galleries counted. Daily temperature data were obtained from the Natl. Weather Service (NOAA) at Oregon State University.

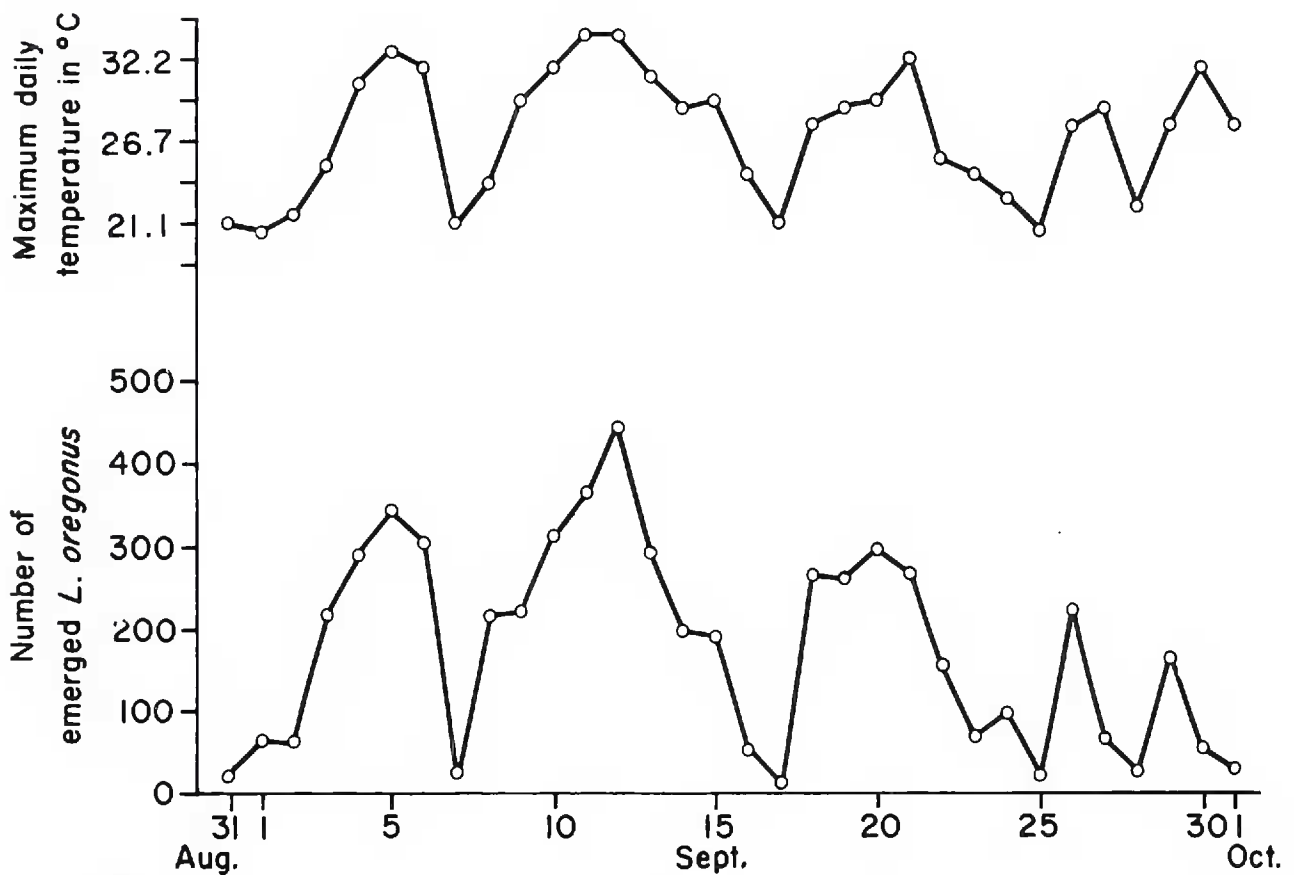
Results

1. Emergence

Between 11 Aug. and 7 Oct. 1975, when emergence was nearly over, 6988 *Leperisinus* adults emerged from 1800 galleries in the 6.38 m² surface area between the base and a point 12.71 m beyond the base, which was 11 cm diam. There were 5659 *L. oregonus* ($\delta \delta / \text{♀} \text{♀} = 1.04$) and 1329 *L. californicus* ($\delta \delta / \text{♀} \text{♀} = 0.96$). Sex ratios were 1:1. Attack density, in galleries per m², was relatively constant along the bole length ($R^2 = .213$). Brood pro-



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Fig. 1. Combined emergence of *Leperisinus oregonus* and *L. californicus* along the length of one felled *Fraxinus latifolia* between 11 August and 7 October 1975. Fig. 2. Hot spells accompanied by waves of *L. oregonus* emergence between 31 August and 1 October 1975.

duction and/or survival decreased significantly from the base to the apex, as measured by beetles per gallery ($R^2 = .789$; Fig. 1) or beetles per m^2 ($R^2 = .647$, no. of *Leperisinus* per $m^2 = 2145-187$ [distance from basal cut in m]). Basal logs had long galleries with many egg niches and larval mines,

whereas apical logs had short galleries with few niches and mines. This may be due to two factors: basal logs were protected from sunlight by moss growth and by shade from an overhanging bush, and their thicker bark probably retarded desiccation and parasite oviposition. Large numbers of the braconid, *Coeloides scolytivorus* (Cresson), emerged mainly from apical sections in August–September 1975 and especially June 1976.

The 32-day period from 31 August through 1 October 1975 was rainless and included five hot spells (Fig. 2, upper curve) during which *L. oregonus* emergence fluctuated correspondingly (Fig. 2, lower curve). Daily emergence increased significantly with maximum daily temperature ($R^2 = .645$, no. of *L. oregonus* = $-454 + 23.2$ (daily °C)). Emergence was low before noon and highest between 2–4 p.m. DST.

2. Maturation

Internal reproductive organs of both *L. californicus* and *L. oregonus* were like those of *L. fraxini* (Jamnický, 1961) in number and arrangement. Adults of both species were sexually immature upon emergence from brood logs. Females had small germaria, little or no follicle differentiation, and small colleterial glands. Males had tiny seminal vesicles, thin accessory glands, but moderate size testes. Adults attracted to cages containing naturally infested logs during colonization or excised from breeding galleries were mature. In females, colleterial glands were enlarged, and each ovariole had a swollen germarium, a thin elongated area, and 2–5 distinctly enlarged eggs. In males, seminal vesicles and accessory glands were enlarged, and testes sometimes appeared fused. Senescent *L. californicus* had enlarged but stiff reproductive systems containing air bubbles and/or congealed material.

Eight *L. californicus* of either sex were found in individual feeding burrows in living trees (during Feb., Mar., Apr., July and Aug.). Some were partly mature, but others were fully mature or senescent so may have been reemerged parents. Their burrows were in twig crotches, nodes, buds, or leaf axils. Abandoned burrows were common.

3. Hymenopterous Parasites

In the field during August 1975, the following parasite species landed on cages containing logs naturally infested with *L. californicus*: *Spathius benefactor* Matthews (Braconidae) females, *Cheiopachus quadrum* (Fabricius) (Pteromalidae), and a few *Harmolita* sp. (Eurytomidae). In the field during July 1978, *Coeloides scolytivorus* (Cresson) (Braconidae) landed on cages containing logs experimentally infested with *L. californicus* pairs.

The following parasites emerged from brood logs colonized mainly by *L. oregonus*: *C. scolytivorus* (males predominant), *S. benefactor* (females predominant), *C. quadrum*, *Habrocytus* sp. (Pteromalidae) and a few *Eurytoma*

sp. (Eurytomidae). The following parasites emerged from brood logs colonized mainly by *L. californicus*: *C. scolytivorus*, *S. benefactor*, and *Habrocytus* sp.

C. quadrum and one *C. scolytivorus* were laboratory-reared from immatures collected in January 1975 from abandoned *Leperisinus* gallery systems in tops of a tree felled spring 1974.

It is not known which species are primary parasites and which may be hyper-parasites. *C. scolytivorus* has been reported as a primary parasite of another North American *Leperisinus*, *L. aculeatus* (Say) (Hoffmann, 1938; Beal and Massey, 1945).

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Footnote

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